

THE SCOPE FOR INNOVATIVE THINKING WITHIN PUBLIC PRIVATE PARTNERSHIPS

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ABSTRACT

The construction sector is routinely accused of being cost driven, with many key decisions taken on the basis of lowest cost instead of quality, safety, the environment and the long-term use of its products. The sector is plagued by traditions, customs and practices that preserve narrowly defined corporate interests at the expense of collaboration and customer orientation. Construction work is traditionally based on a statement of the perceived needs of the client and is accompanied by practices in which cost cutting is prioritised ahead of searching for something different and better. It is not so much about “lean thinking”, as “mean thinking”. Meanwhile, advocates of Public Private Partnership (PPP) procurement claim that not only are projects able to be initiated earlier and result in lower costs, they also provide better value for money, shorter construction times and higher quality in the end-product. Greater scope for innovation and improved working procedures are also claimed, supporting lean thinking, theories and applications. The paper explores some of the implications that Public Private Partnerships now present for the construction industry.

KEYWORDS

Lean Thinking, Lean Construction, Public Private Partnerships, Technology Innovation

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INTRODUCTION AND BACKGROUND

Much has been written about the disparate and inefficient nature of the construction sector. Concern prevails that the industry is cost driven and that too many key decisions are taken on the basis of lowest cost instead of quality, safety, the environment and the long-term use of the product. The approach is more symptomatic of “mean thinking” than “lean thinking”. Researchers and industry commentators have spoken of a lack of integration between design and construction and have accused the actors of having a short-term interest in buildings and other constructed facilities. Moreover, it is said that the construction sector fails to understand the needs of its customers and how to translate their needs effectively into products. Calls for lower costs and higher quality have been raised by some customers, mainly those representing industrial sectors more advanced than construction (Barlow 2000). On the other hand, the construction industry often has to deal with customers who experience difficulties in making their needs explicit, which may also mean that they have little understanding and appreciation of the product and the process that is required to deliver it. Concern is being raised for more knowledgeable and informed clients – clients that can clearly specify their needs and have the expert knowledge to communicate them (Atkin and Leiringer 2000a; ACE 1999).

The last couple of decades have seen a change in how major projects are initiated and executed. Project financing is one of the fields in which this is apparent. Financial engineering has become a crucial ingredient in many, if not all, major projects and new institutional decision-makers have been brought into the project planning phases in order to deal with the structure and timing of project finance (Gann and Salter 2000). The various financing arrangements that are now being used have brought private sector money into the financing of projects in ways that would have been unimaginable a few decades ago (Morris 1994).

The term Public Private Partnership (PPP) has, over the last decade, become one of the most politically and socially fashionable. It is often used to describe a vast range of modern political and financial functions as well as the working arrangements within projects and organisations in multiple areas and industrial sectors throughout the world. The multitude and diversity of projects that are credited as PPPs are immense. Success is often claimed and several reports show total cost savings of 10-20% over project lifetimes (SO 2000; CIC 2000; Statskontoret 1998). Moreover, it is a commonly held view that these kinds of projects provide real incentives and create a business environment that encourages innovation and improved practices in the construction phase (Holti et al. 2000; DS 2000; Atkin 1999). For example, the chief secretary to the UK Treasury stated that “...the search for new opportunities to develop profitable business provides the private sector with an incentive to innovate and try out new ideas – this in turn can lead to better value services, delivered more flexibly and to a higher standard” (HM Treasury Private Finance Taskforce 1999). Furthermore, the UK government stated that PPPs have provided a major boost for the construction industry and that public money is spent more effectively leading to major enhancements in the country’s infrastructure (SO 2000). This opinion is shared by, amongst others, the Swedish Ministry for Industry, Employment and Education (DS 2000).

Today, PPP projects are being carried out or about to start all over Europe. These projects are not the majority in terms of their size or expenditure but they do represent a considerable volume of construction work. The trend today is that governments are looking more and more for these kinds of solutions (Atkin and Leiringer 2000b).

This paper draws on the results of the preliminary phase of the research project 'Public Private Partnerships in Swedish construction' currently being undertaken at the Royal Institute of Technology. Particular interest is given to those projects that involve building construction work. The purpose of the paper is to address some of the theoretical issues of innovation in construction and the existing inhibitors thereof and to define PPPs in relation to construction projects. By so doing, the aim is to go beyond the obvious financial benefits of successful risk transfer and explore the scope for innovation and improved practices within the construction phase of PPP projects.

The discipline of lean construction is high on the agenda for advocates of a modern and customer-focused industry. Although calls for the industry to adopt practices from the manufacturing sector are hardly new, the last decade has seen a growing academic interest in the implementation of lean production principles to construction (Koskela 1992; Akintoye 1995; Barlow 1996; Ballard and Koskela 1998). A growing body of knowledge has been created and success stories can be identified from several different environments. Many of the proposed methods seem, at first sight, to fit well into the context of a PPP project set-up.

INNOVATION

There are many definitions of innovation and literature can easily be found as far back as the early twentieth century (Padmore et al. 1998). It has been defined as the actual use of a nontrivial change in a process, product or system that is novel to the institution developing the change (Freeman 1989). According to the ERT (1998), innovation should be seen as something greater than merely new technology, science and research, and above all it should not be seen as a strictly economic issue. It should also be considered as a way of organising work and social structures in more efficient and humane ways, making organisations more competitive and the workplace more satisfying.

Schumpeter differentiated five kind of innovations: (i) introduction of a new product or a qualitative change in an existing product; (ii) process innovation new to an industry; (iii) the opening of a new market; (iv) development of new sources of supply for raw materials or other inputs; and (v) changes in industrial organisation (Padmore et al. 1998).

A slightly different classification, based on the current theories of innovation in manufacturing, is given by Slaughter (1998). Five types of innovation are recognised: (i) *Incremental innovations* – small changes based on existing technology. Its origin is often to be found within the organisation implementing it. (ii) *Modular innovations* – a significant change within a component, but one that has little effect on other components. (iii) *Architectural innovation* – this constitutes a small change in a component but a major change in the links to other components and systems. (iv) *System innovation* – integrates multiple independent innovations to perform new functions. (v) *Radical innovation* – involves a breakthrough in science or technology that very well could change the character of the industry.

It is argued that these different kinds of innovations require varying levels of co-ordination, resourcing, supervision and timing. The sources of innovations vary between the different levels ranging from the firms engaged in implementation to scientific or engineering research based outside the industry. In construction, innovations are most commonly of the incremental or modular kinds (Koskela and Vrijhoef 2000), meaning that the sources of the improvements most often are to be found within organisations that already exercise control over the components and modules/systems.

This paper does not claim to give any new or more precise definition of innovation. The view is taken that it is more important to recognise what constitutes success and inhibitors in the context of innovation than it is to debate the meaning of the word. For industry, innovation is, even if it may not be the sole reason, about profit generation. Take away this

aspect and there is little point in investments that would merely consume resources without payback. Innovation is when an act, such as an invention or a new idea, begins to have an impact on its surroundings (Atkin 1999). An idea on its own, however logical and brilliant it may be, is still nothing more than an idea.

INHIBITORS TO INNOVATION IN THE CONSTRUCTION SECTOR

According to the European Commission's Green paper on Innovation (EC, 1995), the opposite of innovation is archaism and routine. This is of course not the best starting point for an industry such as construction, which is long since considered to be conservative and to prefer traditional practices based on conventional methods. Organisations that have control over products, systems and modules have a vested interest in retaining their positions and may be reluctant to be part of any change that would upset the *status quo*. Thus, firms tend to manage risk by retaining information crucial to system integration within their own sphere of control, rather than transferring it between the temporary coalitions of firms with whom they collaborate (Gann and Salter 2000).

Koskela and Vrijhoef (2000) cite from earlier work five characteristics of the constructed product, which result in limitations in technology development: immobility, complexity, durability, costliness and a high degree of social responsibility.

Construction projects are geographically dispersed and most clients engage the sector's actors for a single project at a time. These projects are then carried out away from the locations of the actors involved, often in loosely assembled project groups. This is a major difference between construction and manufacturing – firms, their supplies and services come together only when there is a project. Opportunities to innovate within the construction sector are therefore time and, potentially, geographically restrained (Atkin 1999).

It has been claimed that project processes usually present non-routine features that do not easily lend themselves to systematic repetition (Gann and Salter 2000). However, this confusion between the process of delivery and the end product could be seen as one of the key failings of the construction sector. Creating unique architecture and engineering solutions does not necessarily have to come hand in hand with unique procedures to achieve it.

Reluctance to part from tried and tested methods could also to some extent be traced to the expectations of the society. Buildings cannot be discarded in the same way as consumer goods once they have become unfashionable or deemed to fulfil their useful purpose. The most noticeable consequence is in architectural design but other areas include new technology and materials (Atkin 1999).

The nature of competitive bidding, in which functional responsibilities are separated, is a long-standing obstacle to innovation and is often cited by contractors for their lack of innovation. Even so, some contractors have found a way around this dilemma by introducing innovations along their supply chain to the ultimate benefit of clients. In this way, it is possible for contractors to offer reliable competitive bids, because they are based on a more certain process for delivery or at least a more certain understanding of what is needed.

The construction sector follows the cycles of national and regional economy. During a downward period, when construction volumes decrease, it is often claimed that the margins are too low and that it is, therefore, impossible to innovate. During the good times the actors claim to be too busy. Either way little innovation takes place. There has to be an inclination to innovate. The likelihood is that there will be people who feel threatened by new ideas and procedures turning into reality, and will therefore actively work against them.

DEFINITION OF PPP IN RELATION TO CONSTRUCTION PROJECTS

Following the very general definitions given to partnerships, the multitude and diversity of project arrangements that are credited as PPPs are enormous. The term could apply to just

about everything that the public sector, in any country, undertakes with even the slightest participation of the private sector. However, to make things more complicated, PPP is often used in a much-more narrow sense in attempts to describe the characteristics of specific projects. Broadly defined, a Public Private partnership is an arrangement that brings together public and private sectors in long-term arrangement for mutual benefit. This kind of collaboration between a public sector organisation and the private sector suggests that the term could take the meaning of anything from the sale of surplus public sector assets, or the private sector buying shares in state-owned businesses, to the outsourcing of public services. Several interrelating sectors could be identified. From the perspective of the construction sector two of these are of particular importance (Leiringer 2001).

- Arrangements in which the public and private sectors, under joint management, combine their assets, finance and expertise in order to pursue common long-term goals and shared profit.
- The public sector contracts services, with defined outputs, from the private sector including the construction and maintenance of the required facilities and/or infrastructure.

From the construction perspective these projects might not differ from traditional project set-ups e.g. large housing projects. For clarity here, the following definition will be used:

A Public Private Partnership is a partnership between public sector and private sector investors and businesses (“the Private Sector”) whereby the Private Sector on a non or limited recourse finance basis provides a service under a concession for a defined period of time which would otherwise be provided by the State. The provision of such service may involve the Private Sector in the tasks of planning, designing and constructing facilities in order to be in a position to provide the required service.

The origin of projects showing these kinds of characteristics is a matter of debate. It has been suggested that the historical roots can be found in the concession systems of the nineteenth and early twentieth centuries, going as far back as the 1782 with a claimed first concession in France. There was a notable spread of infrastructure concessions in France and several other countries in Europe during the decades following 1830. But these decreased and industrialised countries generally funded new infrastructure investments through their own fiscal resources and sovereign borrowings during the period between the late 1800s and the 1970s. It is therefore more commonly argued that the PPP concept originated through the development of project finance techniques (e.g. the early North Sea oil projects) coinciding with the evolution of privatisation as a crucial policy for improving industrial efficiency (Morris 1994; Walker and Smith 1996; UNIDO 1996).

VARIATIONS ON PPP

No two projects currently being undertaken and classed as PPP are the same. However, the common ground between them can be differentiated and is shown in figure 1.

There are several aspects of the project set-up that deserve thorough consideration. However, this cannot be done in a limited format such as this paper. Only three aspects are developed here.

The special purpose vehicle – is the legal entity, created by the shareholders in the winning bidding company or consortium which contracts with the public sector for the purpose of delivering the service. The SPV is formed just prior to financial close. The members are dependent on the nature, size, scope and complexity of the project at hand. Projects that involve more than a modest amount of construction will most commonly have a construction company as a shareholder, with the same being true for the operators.

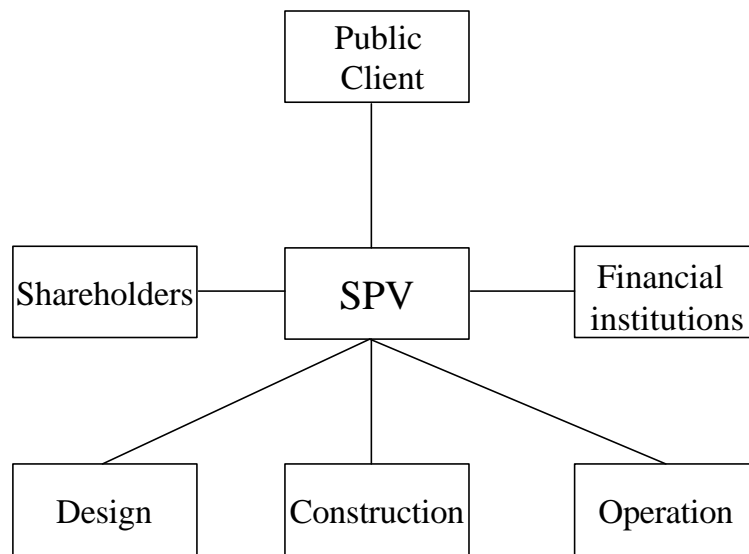


Figure 1. A typical PPP project set-up (after DS 2000)

Service Level Agreements – traditionally, a construction project involves the purchase of a product, governed by legal contracts. The procurement method will, more often than not, involve fixed specifications and profit levels. Risks and uncertainties concerning the project end dates and the means by which it will be accomplished are passed down the supply chain. Public bodies that procure large capital assets using public funds typically have detailed manuals and standards that specify, for example, the designs, materials and components that should be used. The use of these, however, impedes the ability to state what is needed. In PPP procurement, recognition of this has led to output specifications and service level agreements being used often in combination with minimum technical requirements. The exact configuration and details of these are dependent on what the client is empowered to do but perhaps more importantly on the nature of the product and the duration of the project. Of great significance in this context is the actual ownership of the asset and whether or not it will be transferred at some stage.

Risk transfer – traditionally, a construction project involves the purchase of a product, governed by legal contracts. It is common that the procurement method involves fixed specifications and profit levels. Most of the risks are taken by the client, whilst large parts of the risks and uncertainties concerning the project end dates and the means by which the project will be undertaken, are passed down the supply chain (DS 2000). By making the private sector responsible for operations for a specified period, part of the risk previously taken by the public sector is now passed to private sector actors. The rationale is that the risk should be taken by the party best suited to do so.

CLAIMED ACHIEVEMENTS FOR PPP

Banks generally consider borrowing by the state as a low risk business and in most cases it is cheaper for the state to borrow than it is for a private sector actor. What has to be achieved for a PPP to provide best value for money is therefore that the increased costs of finance are compensated in other ways such as appropriate risk transfer and innovations in technology as well as in working procedures.

Several publications, emanating from the UK, have been issued in the last five years citing varying cost savings and increases in quality generated by PPP procurement. In 1998 the UK National Audit Office reported that the first four design, build, finance and operate roads contracts were likely to generate net quantifiable savings of approximately 13% for the state (NAO 1998). In a report, ordered by the Treasury Taskforce, the consultant firm Arthur Anderson, together with Enterprise LSE, examined 29 private finance projects to reveal an average net present cost saving of 17% (HM Treasury Private Finance Taskforce 2000).

In contrast, there are also several reports that show increased costs, lower quality products and an overall decrease in service quality: see, for example, Unison (1999) and CUPE (1998).

Caution has to be applied when comparing these results, as it not always is a question of comparing like with like. One difficulty is determining the most appropriate discount rate. Only a slight deviation in this will dramatically alter the outcome of the calculation.

As it has previously been mentioned, most of the exhibited cost savings are from the valuation of risk transfers. For example, 10 of the 17% cost savings cited in the Arthur Anderson report are derived from the valuation of risk transfers (HM Treasury Private Finance Taskforce 2000). Since PPP projects generally involve replacing cheaper public finance with more expensive private finance, it is commonly believed that the participants in the project will look for compensatory savings in other cost areas – essentially the costs of construction and operation. This in turn would seem to follow the creation of the right kind of collaboration between operators, designers and contractors, to achieve innovative solutions to the client's service requirements. However, not much research has been done in identifying the cost savings that are to be found outside the scope of successful risk transfers. In their study from 2000, the Construction Industry Council identified the role of innovations within construction-based projects. It is stated that cost savings could be accrued from the use of innovative working procedures and new technologies. The results show an overall project saving in the region of 5-10% of which the highest average weighing savings could be found from the construction phase. The savings on the construction costs were also estimated to be 5-10%. Innovations within civil engineering are mainly technical, whereas innovations in building projects are much less frequently technologically based (CIC 2000).

LEAN THINKING

Lean thinking can be applied at several different levels and stages in the process; such as in managing design, controlling the workflow or monitoring the supply chain. These are all more or less interrelated but of most importance for the discussion in this paper is the design phase.

Koskela and Houvila (1997) propose three ways of conceiving design: as a process of converting inputs to outputs (conversion process), as a flow of information and materials (flow process) and as the generation of value for customers.

Traditionally, the rather short-term oriented, conversion model is used in construction. The main idea is that the customer should provide an extensive and correct brief, which would not be subject to change. Studies have been conducted to find out why this approach to design fails time and time again. For example, Ballard and Koskela (1998) state that poor briefing and communication, inadequacies in the technical knowledge of designers and a lack of confidence in preplanning for design are the most significant causes for design problems. In a performance study of the design-construction interface, Alarcón and Mardones (1998) propose that a construction company must participate in the design process, in order to avoid problems related to the lack of construction knowledge of the designers. This might seem a plausible solution, as it appears highly unlikely (and unfair) that the actors involved in the construction should be able to do a good job that fulfils the expectations of the customer if the received design is in shambles or simply flawed. In this context, drawings and specifications

are nothing more than records of earlier decision making of the designer based on his/her skills in interpreting the client's needs and which are then converted into technically correct and viable solutions.

Applying lean thinking to the design stage will mostly affect flow and value processes (Ballard and Howell 1998). What is needed for value to be generated is a change in attitude towards the length and scope of the commitment of the actors involved. Taking a short sighted approach to the process, i.e. being content with merely undertaking clearly specified tasks and then handing over to the next in line, is not what creating value is about. Neither is it necessarily a good thing when one actor improves his/her performance at the expense of the overall performance of the system. Production systems do not always work very well when everyone tries to optimise his/her own performance without taking into consideration how individual actions might affect the larger framework of the project at hand (Howell 1999). Creating value for the customers comes through a proper understanding of their needs and sufficient skills and expertise to be able to convert these needs into something that is compatible with what it was that the customer had in mind. Furthermore, creating value comes from establishing the right kind of relationships between the actors involved (Atkin and Leiringer 2000a). Josephson and Hammarlund (1996) found that the lack of co-ordination between disciplines was the largest category of design-induced defects.

DISCUSSION

It is not possible to give an objective description of the advantages and disadvantages of Public Private Partnerships – that would be too simplistic an approach to take and would trivialise the more pertinent arguments for and against. Neither is it possible to do so for the socio-economic benefits that are claimed to accrue from the implementation of PPP. These issues can be coloured by political and social prejudices. For some political parties it will never be acceptable to let private enterprises profit in areas such as healthcare, no matter how good or beneficial a service might be. However, what is clear is that PPP arrangements are attracting not only considerable interest from both public and private sectors, they are also bringing about changes in an industry that is more used to short-term horizons. Predicting the extent of these changes and the impact that they are likely to have on the sector is yet to be determined and calls for speculation.

Some subtle, but crucial, changes include the use of output specifications. These provide the supplier with more scope to use his own skill and experience to design efficient solutions without being constrained by past practices, rigid standards and norms. But, being provided with the opportunity to be innovative is not always enough for companies to take that extra step and try something new. Whether or not it is forced from harsh competition or because the conditions are extremely favourable, the inclination of the involved actors to be innovative is a crucial factor that must not be underestimated. However, large projects, with a high level of design freedom, seem to be a good starting point for adopting lean construction methodology. The projects have to be thoroughly thought through right from initiation and a great deal of effort is required in the design stages requiring appropriate procedures to be put into place.

It is a fairly self-evident statement that project success will derive largely from the actions and interventions of the various involved actors in the project and those associated with them. Perhaps even more obvious is that understanding the needs of the client organisation in terms of the kind of building or other facility that will satisfy the organisation's requirements is a key factor leading to a successful outcome of the project. Yet, the role of the client is sometimes underestimated as more attention is given to design and construction *per se*. The client has an important part to play as no other actor knows what exactly that is needed and sought after. For pure construction specialists, working for a concessionaire (SPV) will increasingly mean working for a new kind of client, one who has specific needs and expert

knowledge to communicate them. Furthermore it will mean a working environment where greater opportunities exist for collaboration between design, construction and operation. The liability that comes with being responsible for the durability of the built asset for a long period of time provides natural incentives for collaboration over company, specialist and industry borders. Having representatives from both operations and construction involved in the client organisation throughout the process seems to be a step towards a more long-term view of construction.

There are some similarities between lean and mean thinking. Both are about cutting costs at the construction stage but they differ at the customer focus stage. Buildings are not short-term products and should therefore not be treated as such. Construction actors will in the future have to take a longer-term view in their products or they will never be able to accomplish the feat of a fully satisfied client.

PPPs should not be looked upon as a panacea for the construction sector. There exist obstacles and clear contradictions for better practices to be adopted. One such contradiction that cannot be trivialised is the issue of financing and the security that the banks strive for as opposed to the use of new technology and innovative procedures. In some projects the project's future revenue streams will be the only available security and the financial institutions will therefore be very cautious in allowing their money to be invested in novel solutions. It is not a bold statement to say that banks are risk adverse and that they prefer secured loans to the more uncertain project-financing route.

CONCLUSIONS

The importance and impact of construction specifics, organisational characteristics and institutional factors have as of yet not been sufficiently clarified and more research should be put into attaining empirical validity of the theoretical discussion given in this paper. More work is needed in looking into where exactly the innovations in a PPP project might stem from. Furthermore, resources should be put into investigating the contracts between the concessionaire and the contractor and perhaps more importantly into the nature of collaboration between design, construction and operations. Nevertheless, it seems as though some of the proven inhibitors for innovation in the construction sector can be overcome through adopting PPP procurement.

Contractors often complain of the shortage of repeat orders and as a consequence of this not having any continuity in work. This is generally accepted and seen as a major barrier to innovative behaviour. Why should a client trust someone who is not willing to innovate with the construction and operation of a service for 10-30 years? Lean thinking is about continuously striving for perfection and one cannot help but wonder if this is not the signal that the private sector needs to send to its customers.

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